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# Supplement to the Annual Report

ON THE HEALTH OF

# The Urban Sanitary District of Haydock,

*FOR THE YEAR 1901,*

CONTAINING—

(1) A New Life-Table for Haydock, based on the Census Enumerations of 1891 and 1901, and on the recorded deaths for the decennium 1891—1900, shown in comparison with the preceding Life-Table for the ten years 1881—1891, and also with a Life-Table for England and Wales for the years 1881—1891, calculated by the same methods as those which have been employed for the Haydock Life-Tables.

(2) Other Tables, showing the mean age and sex distribution of the Population of Haydock, compared with corresponding figures for the whole of England and Wales.

BY

T. E. HAYWARD, M.B. (Lond.), F.R.C.S.Eng.,

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BRITISH MUSEUM
30 66

HAYDOCK,
1st MAY, 1902.

*To the Chairman of the Haydock Urban District Council.*

SIR,

Appended to my Annual Report for the year 1901, presented to your Council in January last, there were some references to such comparisons as it was then possible to make between the leading Vital Statistics for Haydock relating to the ten years 1891—1900, and the corresponding figures for the preceding decennium 1881—1890.

The recent publication of the Final Report of the facts ascertained at the Census of 1901 for the County of Lancaster has enabled me to continue and complete the series of such comparisons as may be made by the use of the most exact methods which can be employed, based on an accurate knowledge of the age and sex constitution of the population of the District, and on an exact tabulation and correction of the recorded deaths for the period of ten years.

I beg, therefore, to present to your Council the following series of Tables, together with some brief comments thereon, and I would venture to hope that the facts brought forward may be deemed of interest and some practical importance. Even if the results of such comparisons of the two periods as are to be made should not be, as one would have desired, altogether in favour of the latter period, it is best to know the facts as they are, and it will be found that there are at least some points of view in which the comparison is not entirely unfavourable.

I have the honour to be, Sir,

Your obedient servant,

T. E. HAYWARD,

*Medical Officer of Health.*

# POPULATION.

In proceeding to deal with the vital statistics for a decennial period, the first thing required is to have the numbers enumerated at two successive censuses, classified in age-groups for each sex.

Seeing that as regards Haydock the total census returns include the inmates of Haydock Lodge Lunatic Asylum, and that these are a sufficiently large number to lead to serious errors unless taken into account, it is necessary to exclude them from the total numbers.

Table I. below gives the total Population numbers as recorded in the Census Reports for 1891 and 1901, and Table II. gives the numbers of Asylum Inmates who have to be excluded.

## TABLE I.

*Total Population Numbers enumerated at the Censuses of 1891 and 1901.*

| Age-Groups. | Census 1891. | | Census 1901. | |
|---|---|---|---|---|
| | MALES. | FEMALES. | MALES. | FEMALES. |
| 0—5 ... ... | 504 | 491 | 614 | 663 |
| 5—10 ... .. | 438 | 452 | 552 | 548 |
| 10—15 ... ... | 400 | 392 | 482 | 468 |
| 15—25 ... ... | 764 | 534 | 970 | 745 |
| 25—35 ... ... | 543 | 371 | 811 | 619 |
| 35—45 ... ... | 378 | 328 | 502 | 385 |
| 45—55 ... .. | 226 | 196 | 350 | 290 |
| 55—65 ... ... | 167 | 160 | 195 | 165 |
| 65—75 ... ... | 73 | 81 | 85 | 93 |
| 75—85 ... ... | 16 | 18 | 14 | 22 |
| 85— ... .. | 0 | 3 | 1 | 1 |
| At all Ages... ... | 3509 | 3026 | 4576 | 3999 |

## TABLE II.

*Inmates of Haydock Lodge Lunatic Asylum enumerated at the Censuses of 1891 and 1901.*

| Ages. | Census 1891. | | Census 1901. | |
|---|---|---|---|---|
| | MALES. | FEMALES. | MALES. | FEMALES. |
| 0—5 ... .. | — | — | — | — |
| 5—10 ... .. | 1 | — | — | — |
| 10—15 ... ... | — | — | — | — |
| 15—25 ... ... | 4 | 4 | 5 | 1 |
| 25—35 ... ... | 8 | 14 | 13 | 7 |
| 35—45 ... ... | 10 | 16 | 13 | 19 |
| 45—55 ... ... | 15 | 14 | 15 | 15 |
| 55—65 ... ... | 6 | 13 | 9 | 16 |
| 65—75 ... ... | 6 | 9 | 8 | 10 |
| 75—85 ... ... | 3 | 3 | — | 3 |
| 85— ... ... | — | — | — | — |
| At all Ages... ... | 53 | 73 | 63 | 71 |

When in possession of the numerical facts set down in the above tables, it is possible, by means of certain processes of calculation, which need not be here detailed, to arrive at figures which shall express the mean numbers living for each age-group during the ten years 1891-1901. The numbers set down in the following table represent ten times the mean Annual Population, or, in other words, the "years of life" during the decennium.

The numbers given for each of the first five years of age have been arrived at by a calculation from the numbers of Births recorded in the years 1886-1900, and the Deaths registered at the first four years of age, the results being finally corrected to make them correspond with the figures deduced from the Census enumerations for the age-group 0-5.

## TABLE III.

*Mean Numbers living in Haydock for each Age-Period indicated during the years 1891—1900.*

| AGES. | MALES. | FEMALES. |
|---|---|---|
| 0—1 ... ... | 1252 | 1309 |
| 1—2 ... ... | 1144 | 1182 |
| 2—3 ... ... | 1079 | 1105 |
| 3—4 ... ... | 1055 | 1067 |
| 4—5 ... ... | 1018 | 1037 |
| 5—10 ... ... | 4900 | 4963 |
| 10—15 ... ... | 4379 | 4271 |
| 15—25 ... ... | 8544 | 6283 |
| 25—35 ... ... | 6556 | 4738 |
| 35—45 ... ... | 4236 | 3370 |
| 45—55 ... ... | 2678 | 2247 |
| 55—65 ... .. | 1726 | 1481 |
| 65—75 ... ... | 716 | 771 |
| 75—85 ... ... | 135 | 168 |
| 85— ... ... | 5 | 21 |
| At all Ages ... | 39423 | 34013 |

## DEATHS.

After having obtained the above figures relating to Population, the next thing requisite is classify the Deaths which have occurred during the corresponding period of ten years, and in doing this to take all possible care that the needful corrections both of *inclusion* and of *exclusion* shall be made, seeing than an error of one in a Death-number will have a very much greater effect in vitiating results than a similar error in the Population-number.

## TABLE IV.

*Corrected numbers of* DEATHS *belonging to Haydock which have occurred during the ten years 1891—1900.*

| AGES. | MALES. | FEMALES. |
|---|---|---|
| 0—6 months ... | 200 | 128 |
| 6—12 „ ... | 69 | 61 |
| Total under 1 year ... | 269 | 189 |
| 1—2 ... ... | 60 | 65 |
| 2—3 ... ... | 24 | 18 |
| 3—4 ... ... | 11 | 13 |
| 4—5 ... ... | 14 | 7 |
| 5—10 ... ... | 14 | 26 |
| 10—15 .. ... | 16 | 8 |
| 15—25 ... ... | 35 | 27 |
| 25—35 ... ... | 34 | 41 |
| 35—45 ... ... | 45 | 32 |
| 45—55 ... ... | 42 | 27 |
| 55—65 ... ... | 49 | 55 |
| 65—75 ... ... | 68 | 58 |
| 75—85 ... ... | 26 | 25 |
| 85— ... ... | 1 | 3 |
| At all Ages... ... | 708 | 594 |

## DEATH-RATES.

The simplest and most obvious use to be made of the figures in Tables III. and IV. is to calculate *separate death-rates* for each of the age and sex groups, and thus to obtain a more refined and exact test of the vitality of the community than that afforded by the mere "crude" death-rate, *i.e.*, a rate obtained from total population and total deaths.

Such separate death-rates calculated per thousand living are given in the following Table.

As the primary object of this report is to compare the vital experience of Haydock for the decennium 1891-1900 with that for the preceding ten years, the corresponding death-rates for 1881-90 are also set down in the Table and the differences indicated.

It would have been desirable if possible to also show the differences in the vital experience of Haydock for the ten years 1891-1900, from that of the whole of England and Wales *for the same period*, taken as a standard. However, the data for enabling this to be done will probably not be available for some time to come. In the meantime, therefore, in Table V., and in following Tables, corresponding figures relating to England and Wales for the decennium 1881-90 are set down for the sake of comparison.

### TABLE V.

MEAN ANNUAL DEATH-RATES PER THOUSAND LIVING.

*(The mean population numbers on which these are based have been in each case calculated by the same methods).*

| AGES. | England and Wales, 1881-90. | | (a) Haydock, 1881-90. | | (b) Haydock, 1891-1900. | | Differences of (b) from (a). | |
|---|---|---|---|---|---|---|---|---|
| | MALES. | FEMALES. | MALES. | FEMALES. | MALES. | FEMALES. | MALES. | FEMALES. |
| 0—1 | 179·10 | 142·67 | 147·74 | 138·29 | 211·21 | 143·18 | +63·47 | + 4·89 |
| 1—2 | 58·99 | 54·14 | 56·82 | 52·91 | 52·43 | 54·98 | — 4·39 | + 2·07 |
| 2—3 | 24·12 | 23·27 | 20·68 | 26·46 | 22·23 | 16·29 | + 1·55 | —10·17 |
| 3—4 | 15·50 | 15·25 | 15·80 | 17·60 | 10·43 | 12·18 | — 5·37 | — 5·42 |
| 4—5 | 11·47 | 11·08 | 8·50 | 7·26 | 13 75 | 6·75 | + 5·25 | — 0·51 |
| 0—5 | 61·64 | 51·97 | 52·70 | 50·31 | 68·14 | 51·22 | +15·44 | + 0·91 |
| 5—10 | 5·35 | 5 26 | 5·66 | 5·03 | 2·86 | 5·24 | — 2·80 | + 0·21 |
| 10—15 | 2·95 | 3·11 | 2·48 | 1·74 | 3·65 | 1·87 | + 1·17 | + 0·13 |
| 15—25 | 4·97 | 4·97 | 2·62 | 5·07 | 4·10 | 4·30 | + 1·48 | — 0·77 |
| 25—35 | 7·77 | 7·38 | 5·40 | 7·56 | 5·19 | 8·65 | -- 0·21 | + 1·09 |
| 35—45 | 12·40 | 10·59 | 12·19 | 7·70 | 10·62 | 9·50 | — 1·57 | + 1·80 |
| 45—55 | 19·38 | 15·12 | 17·54 | 16·42 | 15·68 | 12·02 | — 1·86 | — 4·40 |
| 55—65 | 34·73 | 28·48 | 31·93 | 27·82 | 28·39 | 37·14 | — 3·54 | + 9·32 |
| 65—75 | 70·50 | 60·46 | 87·70 | 71·78 | 94·92 | 75·23 | + 7·22 | + 3·45 |
| 75 and upwards | 162·75 | 148·12 | 229·63 | 188·68 | 193·82 | 147·91 | —35·81 | —40·77 |
| At all Ages | 20·29 | 18·08 | 17·00 | 17·81 | 17·96 | 17·46 | + 0·96 | — 0·35 |

Before comparisons can be fairly made between the death-rates of a district and those of the whole country, or even between the death-rates for the *same* district for *two successive decennial periods*, regard must be paid to the age and sex distribution of the respective mean populations, that is to say, the death-rates in age-groups for two periods must be *applied to a population similarly constituted.*

Thus in order to compare the death-rates of Haydock for the decennium 1891-1900 with those for 1881-1890, the death-rates for the first-mentioned period may be applied to the total mean population for this period with the same proportionate distribution into age and sex groups as that found to exist for the last-named period.

The following Table VI. has been prepared to show the proportionate mean distribution of Population for England and Wales in 1881–90, and for Haydock in 1881—90 and 1891–1900.

(In Table VIa is also given the proportionate distribution of the Population at each of the three Censuses—1881, 1891, and 1901, but the numbers in Table VI. are those required for calculating death-rates, &c.)

## TABLE VI.

Mean Proportionate Distribution of Population in Age and Sex Groups per 100,000.

| AGES. | England and Wales, 1881-90. | | (a) Haydock, 1881-90. | | (b) Haydock, 1891-1900. | | Differences of (b) from (a). | |
|---|---|---|---|---|---|---|---|---|
| | MALES. | FEMALES. | MALES. | FEMALES. | MALES. | FEMALES. | MALES. | FEMALES. |
| 0—1 | 1420 | 1417 | 1787 | 1758 | 1704 | 1783 | — 83 | + 25 |
| 1—2 | 1311 | 1320 | 1641 | 1670 | 1558 | 1610 | — 83 | — 60 |
| 2—3 | 1261 | 1272 | 1611 | 1636 | 1470 | 1505 | —141 | —131 |
| 3—4 | 1234 | 1246 | 1581 | 1610 | 1436 | 1453 | —145 | —157 |
| 4—5 | 1216 | 1228 | 1568 | 1606 | 1386 | 1412 | —182 | —194 |
| 0—5 | 6442 | 6483 | 8188 | 8280 | 7554 | 7763 | —634 | —517 |
| 5—10 | 5942 | 5976 | 7361 | 7295 | 6672 | 6759 | —689 | —536 |
| 10—15 | 5474 | 5469 | 6055 | 5758 | 5963 | 5816 | — 92 | + 58 |
| 15—25 | 9256 | 9770 | 10800 | 7563 | 11635 | 8556 | +835 | +993 |
| 25—35 | 7105 | 7737 | 8324 | 6390 | 8928 | 6452 | +604 | + 62 |
| 35—45 | 5505 | 5892 | 5604 | 4542 | 5769 | 4589 | +165 | + 47 |
| 45—55 | 4041 | 4443 | 3611 | 3044 | 3647 | 3059 | + 36 | + 15 |
| 55—65 | 2721 | 3092 | 2296 | 2216 | 2350 | 2016 | + 54 | —200 |
| 65—75 | 1517 | 1828 | 1045 | 1138 | 976 | 1050 | — 69 | — 88 |
| 75—85 | 503 | 655 | 217 | 242 | 183 | 229 | — 34 | — 13 |
| 85— | 56 | 93 | 8 | 23 | 6 | 28 | — 2 | + 5 |
| All Ages | 48562 | 51438 | 53509 | 46491 | 53683 | 46317 | +174 | —174 |

## TABLE VIa.

Showing the Age and Sex Constitution of the Population of Haydock, after deducting the Inmates of Haydock Lodge Lunatic Asylum, as enumerated at the Censuses of 1881, 1891, and 1901, in proportions per ten thousand.

| Age Groups. | Census, 1881. | | | Census, 1891. | | | Census, 1901. | | |
|---|---|---|---|---|---|---|---|---|---|
| | MALES. | FEMALES. | PERSONS. | MALES. | FEMALES. | PERSONS. | MALES. | FEMALES. | PERSONS. |
| 0—5 ... | 850 | 887 | 1737 | 786 | 766 | 1552 | 728 | 786 | 1514 |
| 5—10 ... | 788 | 752 | 1540 | 682 | 705 | 1387 | 654 | 649 | 1303 |
| 10—15 ... | 588 | 542 | 1130 | 624 | 612 | 1236 | 571 | 554 | 1125 |
| 15—25 .. | 979 | 689 | 1668 | 1186 | 828 | 2014 | 1143 | 881 | 2024 |
| 25—35 ... | 830 | 717 | 1547 | 835 | 557 | 1392 | 946 | 725 | 1671 |
| 35—45 ... | 547 | 423 | 970 | 574 | 487 | 1061 | 579 | 433 | 1012 |
| 45—55 .. | 391 | 324 | 715 | 329 | 284 | 613 | 397 | 326 | 723 |
| 55—65 .. | 209 | 214 | 423 | 251 | 229 | 480 | 220 | 177 | 397 |
| 65—75 ... | 105 | 115 | 220 | 105 | 112 | 217 | 91 | 98 | 189 |
| 75 and upwards | 25 | 25 | 50 | 20 | 28 | 48 | 18 | 24 | 42 |
| At all Ages... | 5312 | 4688 | 10000 | 5392 | 4608 | 10000 | 5347 | 4653 | 10000 |

The leading facts brought into view by the above Tables are—

(1) That, as regards the whole of England and Wales, whereas the proportion of Males is less than that of Females, in Haydock there exists a very considerable excess of Males over Females.

(2) That, as compared with England and Wales, there exists in Haydock an excess of persons at ages from birth to age 35, and the reverse at later ages.

(3) That the changes in age distribution in Haydock from 1891—1900, as compared with the preceding decennium are mainly—

(a) A lessened proportion of persons at ages from birth to age 15, and from age 55 onwards.

(b) An increased proportion of persons at ages from 15 to 55.

What the precise nett results of altered age and sex distribution will be, can only be determined in each case by actual calculation.

The following Table shows to what extent the altered age and sex distribution of population in Haydock has affected the total death-rates.

### TABLE VII.

COMPARISON OF HAYDOCK DEATH-RATES IN 1881-90 AND 1891—1900.

| | MALES. | FEMALES. | PERSONS. |
|---|---|---|---|
| | A—CRUDE DEATH RATES. | | |
| (a) 1881—1890 ... ... | 17·00 | 17·81 | 17·38 |
| (b) 1891—1900 ... ... | 17·96 | 17·46 | 17·73 |
| Differences of (b) from (a) ... | +0·96 | —0·35 | +0·35 |
| | B—SAME AGE AS SEX CONSTITUTION OF POPULATION IN 1881–1890 AS IN 1891—1900. | | |
| (a) 1881—1890 ... ... | 16·30 | 17·52 | 16·87 |
| (b) 1891—1900 ... ... | 17·96 | 17·46 | 17·73 |
| Differences of (b) from (a) ... | +1·66 | —0·06 | +0·86 |

It is thus evident that by eliminating the factor of altered age and sex distribution the death-rates for 1891—1900 are rendered somewhat less favourable in comparison with those for 1881—1890.

## A NEW LIFE TABLE FOR HAYDOCK.

In addition to the comparatively simple method of death-rates, there is another way of bringing into contrast the vital experience of a district in succeeding decennial periods which is effected by the working out of Life-Tables.

It will be within the knowledge of your Council that four years ago I presented a Supplement to my Annual Report for the year 1897, in which a Life Table was included, which had been worked out based on the facts of population and deaths for Haydock relating to the ten years, 1881-90.

In this Supplement I endeavoured to very fully explain what a Life-Table is and how it is to be constructed. There is therefore, no need to enter on this occasion into explanations at such length as before.

It is necessary, however, to remark that since working out the Life-Table alluded to, I have become aware of what I believe to be improved and more accurate methods of calculation, and I have therefore applied these to the re-working out of the previous Life-Table from the same data. The differences obtained have not been very considerable, but they have been sufficiently great to make it desirable to eliminate the error of applying different methods to two Life-Tables.

The three Life-Tables to be presently compared have been constructed by exactly the same methods, and they are, therefore, fairly comparable.

In proceeding to construct a Life Table for Haydock, based on the vital experience of the district, for the ten years 1891 – 1900, it is assumed that a certain number, say a hundred thousand, of males and females respectively set out on the journey of life together by being born at the same moment, and that thereafter they become successively subjected at each age-period to the death-rates which are given in Table V, that is to say, that the mean death-rates which occurred in Haydock during the ten years, *simultaneously,* are assumed to exist *in succession* until the whole generation has become extinct.

By means of the processes of calculation employed, it is then possible to answer these two questions :—

(1) Of the original 100,000 of males and females, how many survivors would remain at successive ages ?

(2) What would be the number of years, on the average, which each survivor at a given exact age would have to live ? or, in other words, what would be the mean after life-time or expectation of life ?

In the following two Tables the answers are given.

## TABLE VIII.

SHOWING THE NUMBER OF SURVIVORS AT EACH EXACT AGE INDICATED OUT OF 100,000 BORN.

| AGE. | England and Wales, 1881—1890. | | (a) Haydock, 1881—1890. | | (b) Haydock, 1891—1900. | | Differences of (b) from (a). | |
|---|---|---|---|---|---|---|---|---|
| | MALES. | FEMALES. | MALES. | FEMALES. | MALES. | FEMALES. | MALES. | FEMALES. |
| 0 | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | | |
| 1 | 83,891 | 86,908 | 86,506 | 87,230 | 78,510 | 85,564 | —7,996 | —1,666 |
| 5 | 75,158 | 78,355 | 78,131 | 78,594 | 71,119 | 78,183 | —7,012 | — 411 |
| 10 | 73,175 | 76,320 | 75,951 | 76,643 | 70,110 | 76,161 | —5,841 | — 482 |
| 15 | 72,102 | 75,142 | 75,017 | 75,999 | 68,841 | 75,452 | —6,176 | — 547 |
| 25 | 68,602 | 71,500 | 73,075 | 72,243 | 66,078 | 72,278 | —6,997 | + 35 |
| 35 | 63,473 | 66,414 | 69,231 | 66,981 | 62,739 | 66,286 | —6,492 | — 695 |
| 45 | 56,070 | 59,740 | 61,284 | 62,015 | 56,416 | 60,281 | —4,868 | —1,734 |
| 55 | 46,189 | 51,359 | 51,425 | 52,626 | 48,228 | 53,455 | —3,197 | + 829 |
| 65 | 32,642 | 38,629 | 37,365 | 39,845 | 36,307 | 36,869 | —1,058 | —2,976 |
| 75 | 16,123 | 21,102 | 15,537 | 19,432 | 14,043 | 17,370 | —1,494 | —2,062 |
| 85 | 3,707 | 5,697 | 2,093 | 2,909 | 2,026 | 3,947 | — 67 | +1,038 |
| 95 | 170 | 373 | 0 | 42 | 0 | 246 | | + 204 |

With regard to the above Table it may be remarked that by the employment of different methods of calculation it is possible to obtain, especially at the later ages, widely differing numbers of survivors, but seeing that in this Table *similar methods have been used in each case,* the results are, at least to a large extent, *fairly comparable.*

In the comparison of the Haydock Life-Tables it is seen that, corresponding to the greatly increased death-rate for males at the first year of existence, the number of survivors at age 1 is greatly diminished, and this, in spite of more favourable death-rates at some later ages, causes a diminished number of survivors right on to the end.

The differences in the Female Columns are irregular, corresponding to the irregular fluctuations in the death-rates shown in Table V.

## TABLE IX.

SHOWING, EXPRESSED IN YEARS, THE MEAN EXPECTATION OF LIFE OR AFTER-LIFETIME OF THE INDIVIDUALS SURVIVING AT EACH *Exact* AGE INDICATED.

| AGE. | England and Wales, 1881—1890. | | (a) Haydock, 1881—1890. | | (b) Haydock, 1891—1900. | | Differences of (b) from (a). | |
|---|---|---|---|---|---|---|---|---|
| | MALES. | FEMALES. | MALES. | FEMALES. | MALES. | FEMALES. | MALES. | FEMALES. |
| 0 | 43·32 | 46·67 | 46·09 | 46·85 | 42·42 | 46·25 | —3·67 | —0·60 |
| 1 | 50·56 | 52·66 | 52·22 | 52·65 | 52·94 | 52·98 | +0·72 | +0·33 |
| 2 | 52·61 | 54·56 | 54·25 | 54·48 | 54·77 | 54·95 | +0·52 | +0·47 |
| 3 | 52·88 | 54·83 | 54·37 | 54·93 | 54·99 | 54·85 | +0.62 | —0·08 |
| 4 | 52·70 | 54·66 | 54·23 | 54·90 | 54·56 | 54·51 | +0·33 | —0·39 |
| 5 | 52·30 | 54·27 | 53·70 | 54·29 | 54·31 | 53·85 | +0·61 | —0·44 |
| 10 | 48·65 | 50·65 | 50·16 | 50·60 | 50·17 | 50·24 | +0·01 | —0·36 |
| 15 | 44·33 | 46·40 | 45·75 | 46·02 | 45·93 | 45·69 | +0·18 | —0·33 |
| 20 | 40·28 | 42·40 | 41·25 | 41·96 | 41·78 | 41·35 | +0·53 | —0·61 |
| 25 | 36·34 | 38·51 | 36·83 | 38·15 | 37·64 | 37·48 | +0·81 | —0·67 |
| 30 | 32·53 | 34·74 | 32·59 | 34·46 | 33·51 | 33·90 | +0·92 | —0·56 |
| 35 | 28·87 | 31·08 | 28·60 | 30·76 | 29·38 | 30·42 | +0·78 | —0·34 |
| 40 | 25·38 | 27·51 | 25·04 | 26·76 | 25·68 | 26·73 | +0·64 | —0·03 |
| 45 | 22·04 | 24·01 | 21·67 | 22·83 | 22·12 | 22·96 | +0·45 | +0·13 |
| 50 | 18·79 | 20·50 | 18·23 | 19·33 | 18·55 | 18·97 | +0·32 | —0·36 |
| 55 | 15·71 | 17·12 | 14·89 | 16·03 | 15·05 | 15·26 | +0·16 | —0·77 |
| 60 | 12·84 | 14·00 | 11·62 | 12·69 | 11·51 | 12·38 | —0·11 | —0·31 |
| 65 | 10·24 | 11·17 | 8·69 | 9·62 | 8·40 | 9·98 | —0·29 | +0·36 |
| 70 | 7·98 | 8·71 | 6·47 | 7·03 | 6·35 | 7·86 | —0·22 | +0·83 |
| 75 | 6·06 | 6·62 | 4·64 | 4·94 | 4·72 | 6·09 | +0·08 | +1·15 |
| 80 | 4·53 | 4·98 | 2·90 | 3·54 | 2·96 | 4·69 | +0·06 | +1·15 |
| 85 | 3·32 | 3·69 | 1·48 | 2·56 | 1·48 | 3·59 | ±0·00 | +1·03 |
| 90 | 2·40 | 2·75 | 0·48 | 1·85 | 0·44 | 2·74 | —0·04 | +0·89 |
| 95 | 1·72 | 1·97 | — | 1·27 | — | 2·09 | | +0·82 |

If it be borne in mind that the numbers of survivors at a given exact age, as set down in Table VIII, depend upon the *preceding* death-rates, and that the years of future lifetime at the same exact age, as given in Table IX, depend upon *following* death-rates, it will be understood that in comparing the two Haydock Life Tables, whereas we find that the increased death-rate for males under one year of age has had the result of *diminishing* the expectation of Life *at birth* by more than three and a half years, the more favourable death-rates at ages 1—2, 3—4, 5—10, &c., have had the effect of somewhat *increasing* the expectation of Life from ages 1 to 55. (See note *(d)* on page 12).

The fluctuations in the Female Tables are not of much moment. On the whole there is but little difference. Such anomalies and irregular variations will always be found in comparatively small populations.

In the next Table will be shown how the mean years of after-lifetime *at Birth* are distributed between the main age-periods of life.

## TABLE X.

AVERAGE DISTRIBUTION OF EXPECTATION OF LIFE *at Birth* IN AGE PERIODS.

| LIFE-PERIODS. | Age limits of periods. | England and Wales, 1881—1890. | | (a) Haydock, 1881—1890. | | (b) Haydock, 1891—1900. | | Differences of (b) from (a) | |
|---|---|---|---|---|---|---|---|---|---|
| | | MALES. | FEMALES. | MALES. | FEMALES. | MALES. | FEMALES. | MALES. | FEMALES. |
| Infancy . . ... | 0—5 | 4·02 | 4·16 | 4·14 | 4·18 | 3·80 | 4·12 | —0·34 | —0·06 |
| School-age ... | 5—15 | 7·34 | 7·65 | 7·63 | 7·70 | 7·00 | 7·65 | —0·63 | —0·05 |
| Working period of Life | 15—65 | 28·62 | 30·54 | 31·07 | 31·14 | 28·57 | 30·80 | —2·50 | —0·34 |
| Decline ... | 65 and upwards | 3·34 | 4·32 | 3·25 | 3·83 | 3·05 | 3·68 | —0·20 | —0·15 |
| TOTAL ... ... | All Ages | 43·32 | 46·67 | 46·09 | 46·85 | 42·42 | 46·25 | —3·67 | —0·60 |

Seeing that the numbers given in Table IX express the average years of future lifetime for individuals at each *exact* age indicated, they cannot be applied to population numbers in age-groups as enumerated at the Census, from which we learn, *not* how many are living—say at the exact ages 5 and 10—but how many are living in the age group 5—10, who may be of any age from 5 to just under 10.

However, by certain other processes of calculation, numbers may be obtained expressing the average years of future lifetime for all the individuals comprised within the usual age-groups. Such numbers are given in the following Table.

## TABLE XI.

Mean Expectation of Life, or After-Lifetime, of all the Individuals comprised within the Age-Groups indicated.

| Age-Groups. | England and Wales, 1881—1890. | | (a) Haydock, 1881 - 1890. | | (b) Haydock, 1891—1900. | | Differences of (b) from (a). | |
|---|---|---|---|---|---|---|---|---|
| | Males. | Females. | Males. | Females. | Males. | Females. | Males. | Females. |
| 0—5 .. | 51·76 | 54·07 | 53·06 | 53·50 | 53·23 | 53·51 | +0·17 | +0·01 |
| 5—10 ... | 50·58 | 52·56 | 52·03 | 52·55 | 52·34 | 52·15 | +0·31 | —0·40 |
| 10—15 ... | 46·49 | 48·53 | 47·96 | 48·31 | 48·05 | 47·97 | +0·09 | —0·34 |
| 15—25 ... | 40·33 | 42·46 | 41·29 | 42·09 | 41·79 | 41·59 | +0·50 | —0·50 |
| 25—35 ... | 32·61 | 34·82 | 32·70 | 34·51 | 33·55 | 33·98 | +0·85 | −0·53 |
| 35—45 ... | 25·48 | 27·65 | 25·17 | 26·84 | 25·79 | 27·08 | +0·62 | +0·24 |
| 45—55 ... | 18 93 | 20·63 | 18·37 | 19·48 | 18·67 | 19·13 | +0·30 | —0·35 |
| 55—65 ... | 13·06 | 14·24 | 11·89 | 12·93 | 11·80 | 12·69 | —0·09 | −0·24 |
| 65—75 ... | 8·34 | 9·06 | 6·89 | 7·47 | 6·74 | 8·22 | —0·15 | +0·75 |
| 75—85 ... | 4·94 | 5·41 | 3·46 | 3·99 | 3·51 | 5·06 | +0·06 | +1·07 |
| 85—95 ... | 2·78 | 3·11 | 0·98 | 2·18 | 0·96 | 3·12 | —0·02 | +0·94 |
| 95— ... | 1·62 | 1·87 | 0 | 1·17 | 0 | 1·99 | | +0 82 |

The above Table may be made use of, practically, as follows:—

By deducting the numbers in Table II from those in Table I we obtain the corrected numbers of the Population of Haydock, as enumerated at the Census of 1901, distributed in age-groups. If we assume that the life-value of each individual may be forecasted by the results of the vital experience of Haydock in the ten years 1891—1900, then by multiplying the number in each age-group of the population by the appropriate average value given in Table XI, and adding up the results, we shall obtain the sum total of the years of future lifetime belonging to the total corrected population of Haydock at the date of the Census of 1901, or, in other words, we shall form an estimate of the *total* Life-Capital of the community, and then by dividing this total by the number of individuals we shall have the estimated *average* Life-Capital.

By proceeding thus the following results are obtained.

| | Population. | Total Life-Capital. | Average Life-Capital. |
|---|---|---|---|
| Males ... .. | 4,513 | 173,470 | 38·44 |
| Females .. | 3,928 | 156,336 | 39 80 |
| Persons ... | 8,441 | 329,806 | 39·07 |

The following Table XII gives the comparative figures arrived at by this mode of measuring vitality.

## TABLE XII.

### Average Life-Capital.

| | England and Wales, Census 1891. | (a) Haydock, Census, 1891. | (b) Haydock, Census 1901. | Differences of (a) from (b). |
|---|---|---|---|---|
| Males ... ... | 36·13 | 38·51 | 38·44 | —0·07 |
| Females ... | 37·43 | 39·96 | 39·80 | —0·16 |
| Persons ... | 36·80 | 39·18 | 39·07 | —0·11 |

The comparatively small differences of the average Life-Capital in 1901 from that in 1891 are the result of two factors—(1) the altered mean values of expectation of life, as shown in Table XI; and (2) the altered age and sex-distribution of population as shown in Table VIa.

In order to eliminate the latter factor a calculation has been made from the mean values of expectation of life for 1891—1900 and the Census Population of 1891, and the differences then come out, as follows:—

### Average Life-Capital in Haydock.

| | (a) Census Population of 1891. | (b) Census Population of 1901. | Differences of (b) from (a). |
|---|---|---|---|
| Males ... ... | 38·02 | 38·44 | +0·42 |
| Females ... ... | 39·90 | 39·80 | −0·10 |
| Persons ... .. | 38·94 | 33·07 | +0·13 |

The practical outcome of the whole series of comparisons which have been made for the two decennial periods is that, apart from the excessive death-rate for males under 1 year of age which existed in the latter period, and the consequences thereof, there are no very great differences, and in some respects at least the latter period compares favourably with the former.

Such unfavourable points as exist have been in my opinion due to the considerable immigration into Haydock during recent years of persons possessing less innate vitality than that which belonged to the previously existing population.

*(Note (a) to Table V., page 4).*

As a higher standard of comparison than that derived from the statistics for the whole of England and Wales in 1881-90, the following Table Va shows the corresponding death-rates for the aggregate of 263 districts which were selected from the whole country as having total death-rates coming below 15 per 1000, after corrections had been made for the age and sex constitution of their respective populations. The populations of these districts amounted, taken together, to about one-sixth of that of the whole country.

(See Supplement to the Fifty-fifth Annual Report of the Registrar-General, Part II.)

## TABLE Va.

*Death-rates of the* SELECTED HEALTHY DISTRICTS *of England and Wales in 1881-90.*

| AGES. | MALES. | FEMALES. |
|---|---|---|
| 0—1 ... ... | 129·07 | 99·44 |
| 1—2 ... ... | 33·77 | 30·29 |
| 2—3 ... ... | 13·25 | 12·64 |
| 3—4 ... ... | 9·08 | 8·67 |
| 4—5 ... ... | 7·14 | 6·68 |
| 0—5 ... ... | 39·70 | 32·38 |
| 5—10 ... ... | 3·88 | 3·86 |
| 10—15 ... ... | 2·28 | 2·71 |
| 15—25 ... ... | 3·96 | 4·73 |
| 25—35 ... ... | 6·15 | 6·21 |
| 35—45 ... ... | 8·52 | 7·96 |
| 45—55 ... ... | 12·80 | 10·70 |
| 55—65 ... ... | 24·16 | 21·07 |
| 65—75 ... .. | 55·54 | 49·75 |
| 75 and upwards ... | 152·06 | 138·85 |

*Note (b) to Table VIII., page 7.*

As in the case of the Death-rates the numbers of survivors given in Table VIII. may be compared with the higher standard of the SELECTED HEALTHY DISTRICTS given below in Table VIIIa, the numbers having been arrived at from the data by exactly similar methods of calculation.

(These numbers, as well as those for England and Wales, differ from the numbers in the official Life-Tables, because they have been arrived at by means of a short method of calculation. It is only claimed for the figures in Tables VIII and VIIIa that having been obtained by the *same method in each case* they are fairly comparable with each other).

## TABLE VIIIa.

*Selected Healthy Districts.—Numbers of Survivors, at given exact ages, out of 100,000 born.*

| AGES. | MALES. | FEMALES. |
|---|---|---|
| 0 ... ... ... | 100,000 | 100,000 |
| 1 ... ... ... | 88,089 | 90,650 |
| 5 ... ... ... | 82,686 | 85,517 |
| 10 ... ... ... | 81,098 | 83,885 |
| 15 ... ... ... | 80,181 | 82,755 |
| 25 ... ... ... | 76,940 | 78,928 |
| 35 ... ... ... | 72,353 | 74,173 |
| 45 ... ... ... | 66,443 | 68,500 |
| 55 ... ... ... | 58,460 | 61,551 |
| 65 ... ... ... | 45,912 | 49,859 |
| 75 ... ... ... | 26,343 | 30,312 |
| 85 .. ... .. | 6,958 | 9,239 |
| 95 ... ... ... | 321 | 630 |

*Note (c) to Table IX., page 8.*

For the sake of obtaining the highest standard of comparison there is given below in Table IXa the mean expectation of Life at each of the given exact ages, worked out from the data of the Selected Healthy Districts by the same methods as those used for the values in Vable IX.

### TABLE IXa.

*Selected Healthy Districts.—Mean After-Lifetime of the Survivors at the given exact ages.*

| AGES. | MALES. | FEMALES. |
|---|---|---|
| 0 ... .. | 51·36 | 53·83 |
| 1 ... ... | 57·27 | 58·35 |
| 2 .. .. | 58·30 | 59·13 |
| 3 ... ... | 57·85 | 58·87 |
| 4 .. ... | 57·51 | 58·38 |
| 5 ... ... | 56·92 | 57·77 |
| 10 ... .. | 52·99 | 53·84 |
| 15 ... ... | 48·56 | 49·54 |
| 25 ... ... | 40·40 | 41·70 |
| 35 ... .. | 32·65 | 34·06 |
| 45 ... ... | 25·11 | 26·47 |
| 55 ... .. | 17·87 | 18·90 |
| 65 ... ... | 11·43 | 12·19 |
| 73 ... ... | 6·46 | 7·03 |
| 85 ... ... | 3·33 | 3·73 |

*Note (d).*

In order to further illustrate the extent to which the mean expectation of Life *at Birth* is affected by the Death-rates at the earliest years of age, the following facts may be noted:—

(1) If the death-rate for Males in Haydock for the *first* year of age had been the same in 1891-1900 as it was in 1881-90, all the other Death-rates for 1891-1900 remaining unaltered, the mean expectation of Life at Birth in the new Life-Table would have been 46·71 years, an excess of 4·29 over 42·42.

(2) If this Death-rate had been in Haydock what it was in the Selected Healthy Districts in 1881-90, the mean expectation of Life at Birth would have been 47·55 years, an excess of 5·13 over 42·42.

(3) If the Death-rates for Males in Haydock for the *first five* years of age had been the same in 1891-1900 as those for the Selected Healthy Districts in 1881-90, all the other Death-rates remaining unaltered, the mean expectation of Life at Birth in the new Life-Table would have been 49·21 years, an excess of 6·79 over 42·42.

(4) On the other hand, if these Death-rates had been as high as those which existed in Manchester Township in 1881-90, all the other Death-rates remaining unaltered, the mean expectation of Life at Birth would have been reduced to 37·36 years, or 5·06 years *less* than 42·42.

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